

Protective Overlay Coatings for Copper Alloy Rocket Engine Combustor Liners



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Plasma Processes, Inc.*

TECHNOLOGY

This protective overlay coatings technology protects an advanced copper alloy known as GRCop-84 as well as other copper alloy liners in order to retain strength and fatigue properties.



COMMERCIAL APPLICATION

Overlay coatings have not been developed for GRCop-84 copper alloy liners, so this offers not only a solution to the problem, but also makes GRCop-84 a viable option to use in combustor liners and rocket nozzles. Traditionally, NARloy-Z has been used in these applications. However, due to the irreversible plastic deformation and cracking of the cooling passages after each mission cycle, GRCop-84 has the potential to be more reliable because of its higher thermal conductivity.



- NiCrAlY overlay coatings have been successfully machined without coating debonding
- Cooling channels have been successfully machined on NiCrAlY coated subscale GRCop-84 liners

SOCIAL / ECONOMIC BENEFIT

◆ The protective coating is expected to increase liner life, allow the engine to operate at higher temperatures and require less frequent maintenance over the use of an uncoated liner.

NASA APPLICATIONS

- ◆ Incorporating a coated GRCop-84 copper alloy liners into large rocket engines will be significantly more cost effective than the materials currently used.
- ◆ This protective coating will allow for the use of GRCop-84 copper alloy liners to be used in the next generation of reusable launch vehicles.

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